PTO/SB/44 (04-04)
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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

B2

Appl. 09825-791

PATENT NO. : 6,888,844
DATED : May 3, 2005
INVENTOR(S) : Mallory et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 114, line 55, Claim 1	Before "a link", Insert --to--

In the Drawings

FIG. 2, Sheet 5 of 101	Delete Drawing Sheet 5 and substitute therefore the Drawing Sheet, consisting of Fig. 2, as shown on the attached page
FIG. 12g, Sheet 18 of 101, 2nd Row, Column 16 7th Row, Column 6 8th Row, Column 3 8th Row, Column 15 9th Row, Column 15	Delete Drawing Sheet 18 and substitute therefore the Drawing Sheet, consisting of Fig. 12g, as shown on the attached page
FIG. 15, Sheet 20 of 101	Delete Drawing Sheet 20 and substitute therefore the Drawing Sheet, consisting of Fig. 15, as shown on the attached page

MAILING ADDRESS OF SENDER:

CHRISTIE, PARKER & HALE, LLP.
P.O. Box 7068
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PATENT NO. 6,888,844

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It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

FIG. 23b, Sheet 26 of 101 5th Row, Column 1 6th Row, Column 1 7th Row, Column 1 8th Row, Column 1 9th Row, Column 1 10th Row, Column 1	Delete Drawing Sheet 26 and substitute therefore the Drawing Sheet, consisting of Figs. 23a & 23b, as shown on the attached page
FIG. 25, Sheet 28 of 101, 1st Row, Column 1 FIG. 26, Sheet 28 of 101, 1st Row, Column 1	Delete Drawing Sheet 28 and substitute therefore the Drawing Sheet, consisting of Figs. 25 & 26, as shown on the attached page
FIG. 28, Sheet 30 of 101	Delete Drawing Sheet 30 and substitute therefore the Drawing Sheet, consisting of Fig. 28, as shown on the attached page
FIG. 30, Sheet 32 of 101	Delete Drawing Sheet 32 and substitute therefore the Drawing Sheet, consisting of Fig. 30, as shown on the attached page
FIG. 37, Sheet 37 of 101, 6th Row, Column 3	Delete Drawing Sheet 37 and substitute therefore the Drawing Sheet, consisting of Fig. 37, as shown on the attached page

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FIG. 42, Sheet 41 of 101, 1st Row, Column 2	Delete Drawing Sheet 41 and substitute therefore the Drawing Sheet, consisting of Fig. 42, as shown on the attached page
FIG. 45, Sheet 45 of 101, 17th Row, Column 3	Delete Drawing Sheet 45 and substitute therefore the Drawing Sheet, consisting of Fig. 45, as shown on the attached page
FIG. 52b, Sheet 51 of 101, 8th Row, Column 1	Delete Drawing Sheet 51 and substitute therefore the Drawing Sheet, consisting of Figs. 52a & 52b, as shown on the attached page
FIG. 52d, Sheet 52 of 101, 2nd Row, Column 4, 5th line 4th Row, Column 4, 3rd line	Delete Drawing Sheet 52 and substitute therefore the Drawing Sheet, consisting of Figs. 52c & 52d, as shown on the attached page
FIG. 52f.1, Sheet 54 of 101, 7th Row, Column 1	Delete Drawing Sheet 54 and substitute therefore the Drawing Sheet, consisting of Fig. 52f.1, as shown on the attached page
FIG. 53, Sheet 56 of 101, 4th Row, Column 2, line 2	Delete Drawing Sheet 56 and substitute therefore the Drawing Sheet, consisting of Fig. 53, as shown on the attached page

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FIG. 58, Sheet 59 of 101, Ref No. 3058 & Ref. No. 3048	Delete Drawing Sheet 59 and substitute therefore the Drawing Sheet, consisting of Fig. 58, as shown on the attached page
FIG. 73, Sheet 73 of 101, Ref. No. 2044	Delete Drawing Sheet 73 and substitute therefore the Drawing Sheet, consisting of Fig. 73, as shown on the attached page
FIG. 74, Sheet 74 of 101	Delete Drawing Sheet 74 and substitute therefore the Drawing Sheet, consisting of Fig. 74, as shown on the attached page
FIG. 75, Sheet 75 of 101	Delete Drawing Sheet 75 and substitute therefore the Drawing Sheet, consisting of Fig. 75, as shown on the attached page
FIG. 77(1), Sheet 77 of 101, 10th Row, Column 3, line 6	Delete Drawing Sheet 77(1) and substitute therefore the Drawing Sheet, consisting of Fig. 77, as shown on the attached page
FIG. 81, Sheet 82 of 101	Delete Drawing Sheet 82 and substitute therefore the Drawing Sheet, consisting of Fig. 81, as shown on the attached page
FIG. 89a, Sheet 93 of 101, 1st Row, Column 3	Delete Drawing Sheet 93 and substitute therefore the Drawing Sheet, consisting of Figs. 88, 89a, 89b, and 89c, as shown on the attached page

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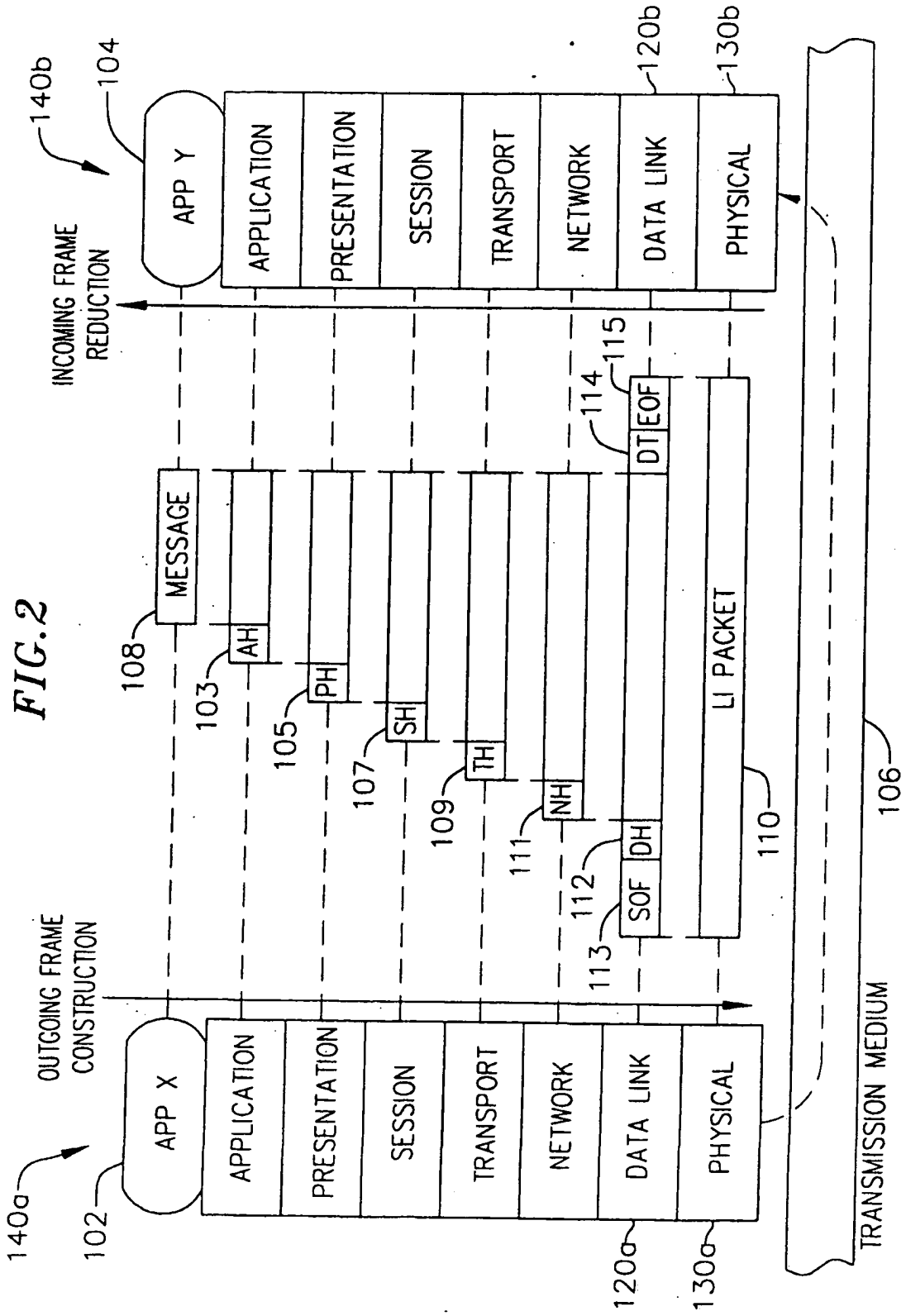
140a
102
APP X
APPLICATION
PRESENTATION
SESSION
TRANSPORT
NETWORK
DATA LINK
PHYSICAL
120a
130a
OUTGOING FRAME CONSTRUCTION
MESSAGE
108
AH
103
PH
105
SH
107
TH
109
NH
111
DH
112
SOF
113
LI PACKET
110
DT
EOF
114
115
TRANSMISSION MEDIUM
106
INCOMING FRAME REDUCTION
140b
104
APP Y
APPLICATION
PRESENTATION
SESSION
TRANSPORT
NETWORK
DATA LINK
PHYSICAL
120b
130b

FIG. 2

FIG. 12g

8 BITS PER BAUD

01100100	01100101	01100111	01100110	01100010	01100011	01100001	01100000	00100000	00100001	00100011	00100010	00100110	00100111	00100101	00100100
01101100	01101101	01101111	01101110	01101010	01101011	01101001	01101000	00101000	00101001	00101011	00101010	00101110	00101111	00101101	00101100
01111100	01111101	01111111	01111110	01111010	01111011	01111001	01111000	00111000	00111001	00111011	00111010	00111110	00111111	00111101	00111100
01110100	01110101	01110111	01110110	01110010	01110011	01110001	01110000	00110000	00110001	00110011	00110010	00110110	00110111	00110101	00110100
01010100	01010101	01010111	01010110	01010010	01010011	01010001	01010000	00010000	00010001	00010011	00010010	00010110	00010111	00010101	00010100
01011100	01011101	01011111	01011110	01011010	01011011	01011001	01011000	00011000	00011001	00011011	00011010	00011110	00011111	00011101	00011100
01001100	01001101	01001111	01001110	01001010	01001011	01001001	01001000	00001000	00001001	00001011	00001010	00001110	00001111	00001101	00001100
01000100	01000101	01000111	01000110	01000010	01000011	01000001	01000000	00000000	00000001	00000011	00000010	00000110	00000111	00000101	00000100
11000100	11000101	11000111	11000110	11000010	11000011	11000001	11000000	10000000	10000001	10000011	10000010	10000110	10000111	10000101	10000100
11001100	11001101	11001111	11001110	11001010	11001011	11001001	11001000	10001000	10001001	10001011	10001010	10001110	10001111	10001101	10001100
11011100	11011101	11011111	11011110	11011010	11011011	11011001	11011000	10011000	10011001	10011011	10011010	10011110	10011111	10011101	10011100
11010100	11010101	11010111	11010110	11010010	11010011	11010001	11010000	10010000	10010001	10010011	10010010	10010110	10010111	10010101	10010100
11110100	11110101	11110111	11110110	11110010	11110011	11110001	11110000	10110000	10110001	10110011	10110010	10110110	10110111	10110101	10110100
11111100	11111101	11111111	11111110	11111010	11111011	11111001	11111000	10111000	10111001	10111011	10111010	10111110	10111111	10111101	10111100
11101100	11101101	11101111	11101110	11101010	11101011	11101001	11101000	10101000	10101001	10101011	10101010	10101110	10101111	10101101	10101100
11100100	11100101	11100111	11100110	11100010	11100011	11100001	11100000	10100000	10100001	10100011	10100010	10100110	10100111	10100101	10100100

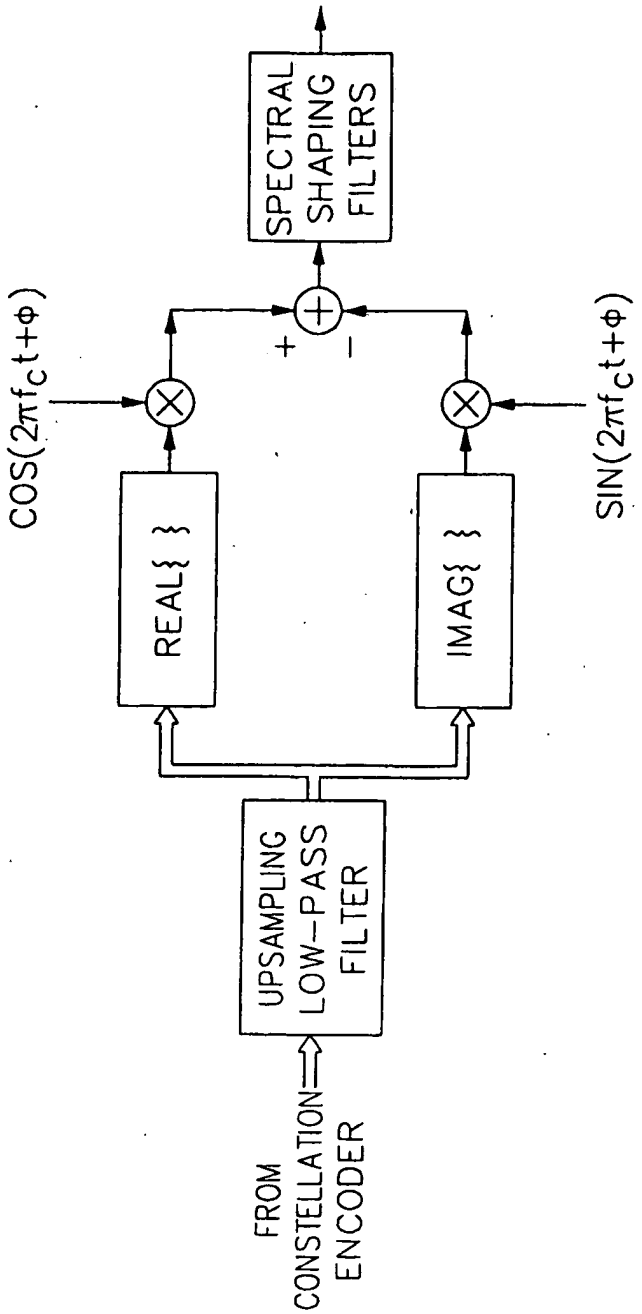
SPECTRAL SHAPING FILTERS
+
−
COS(2πf_c t+φ)
SIN(2πf_c t+φ)
REAL{ }
IMAG{ }
UPSAMPLING LOW-PASS FILTER
FROM CONSTELLATION ENCODER

FIG. 15

FIG.23a

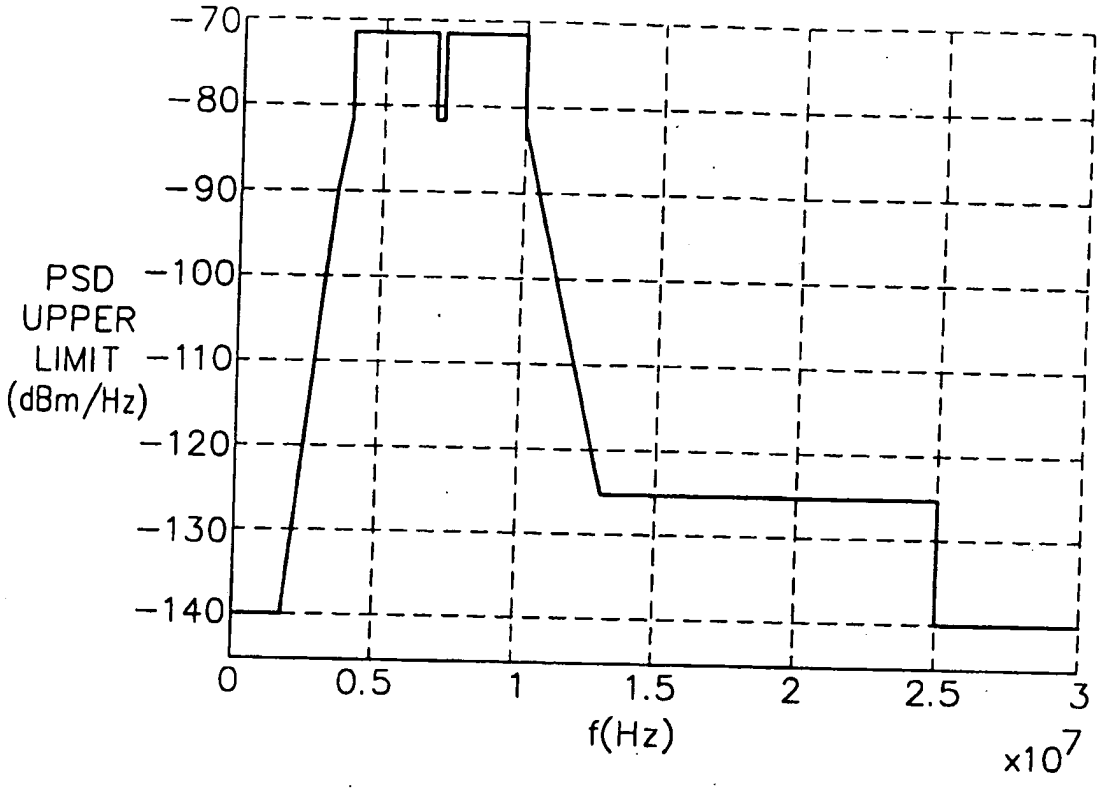

FIG.23b

FREQUENCY(MHz)	PSD LIMIT(dBm/Hz)
0.015<f<=1.7	-140
1.7<f<=3.5	-140+(f-1.7)*50.0/1.8
3.5<f<=4.0	-90+(f-3.5)*17.0
4.0<f<7.0	-71.5
7.0<=f<=7.3	-81.5
7.3<f<10.0	-71.5
10.0<=f<13.0	-81.5-(f-10.0)*43.5/3.0
13.0<=f<25.0	-125
25.0<=f<30.0	-140

FIG.25

FREQUENCY RANGE(MHz)	MAXIMUM PEAK-TO-PEAK INTERFERER LEVEL(VOLTS)
0.01-0.1	6.0
0.1-0.6	3.3
0.6-1.7	1.0
1.7-4.0	0.1
7.0-7.3	0.1
10.0-10.15	0.1
14.0-14.35	0.28
18.068-18.168	0.5
21.0-21.45	0.5
24.89-24.99	0.5
28.0-29.7	0.5

FIG.26

FREQUENCY RANGE(MHz)	MAXIMUM PEAK-TO-PEAK INTERFERER LEVEL(VOLTS)
0.01-0.1	20.0
0.1-0.6	20.0
0.6-1.7	10.0
1.7-4.0	2.5
7.0-7.3	2.5
10.0-10.15	2.5
14.0-14.35	5.0
18.068-18.168	5.0
21.0-21.45	5.0
24.89-24.99	5.0
28.0-29.7	5.0

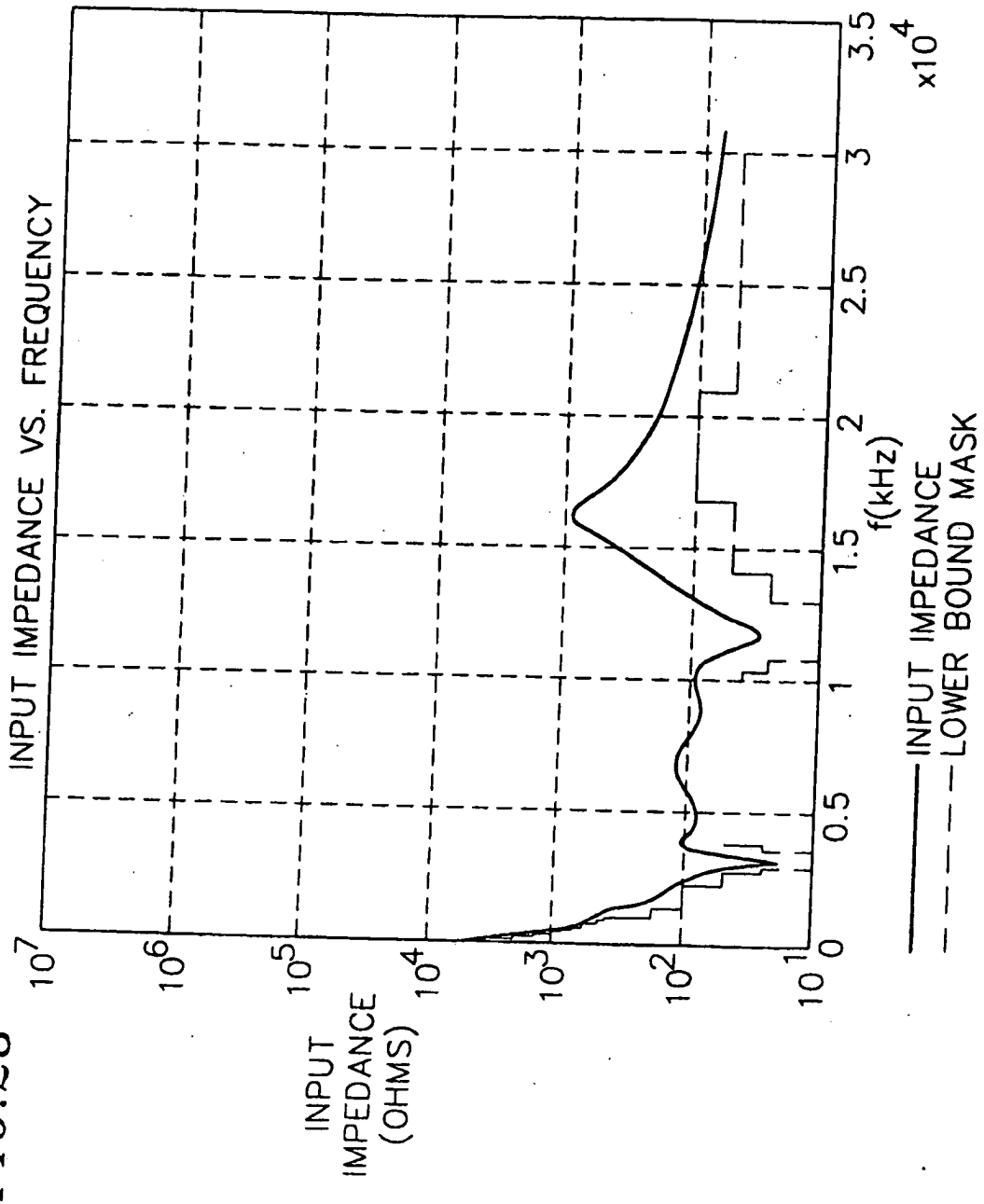
INPUT IMPEDANCE VS. FREQUENCY
INPUT IMPEDANCE (OHMS)
10^7
10^6
10^5
10^4
10^3
10^2
10^1
0
0.5
1
1.5
2
2.5
3
3.5
x10^4
f(kHz)
INPUT IMPEDANCE
LOWER BOUND MASK

FIG. 28

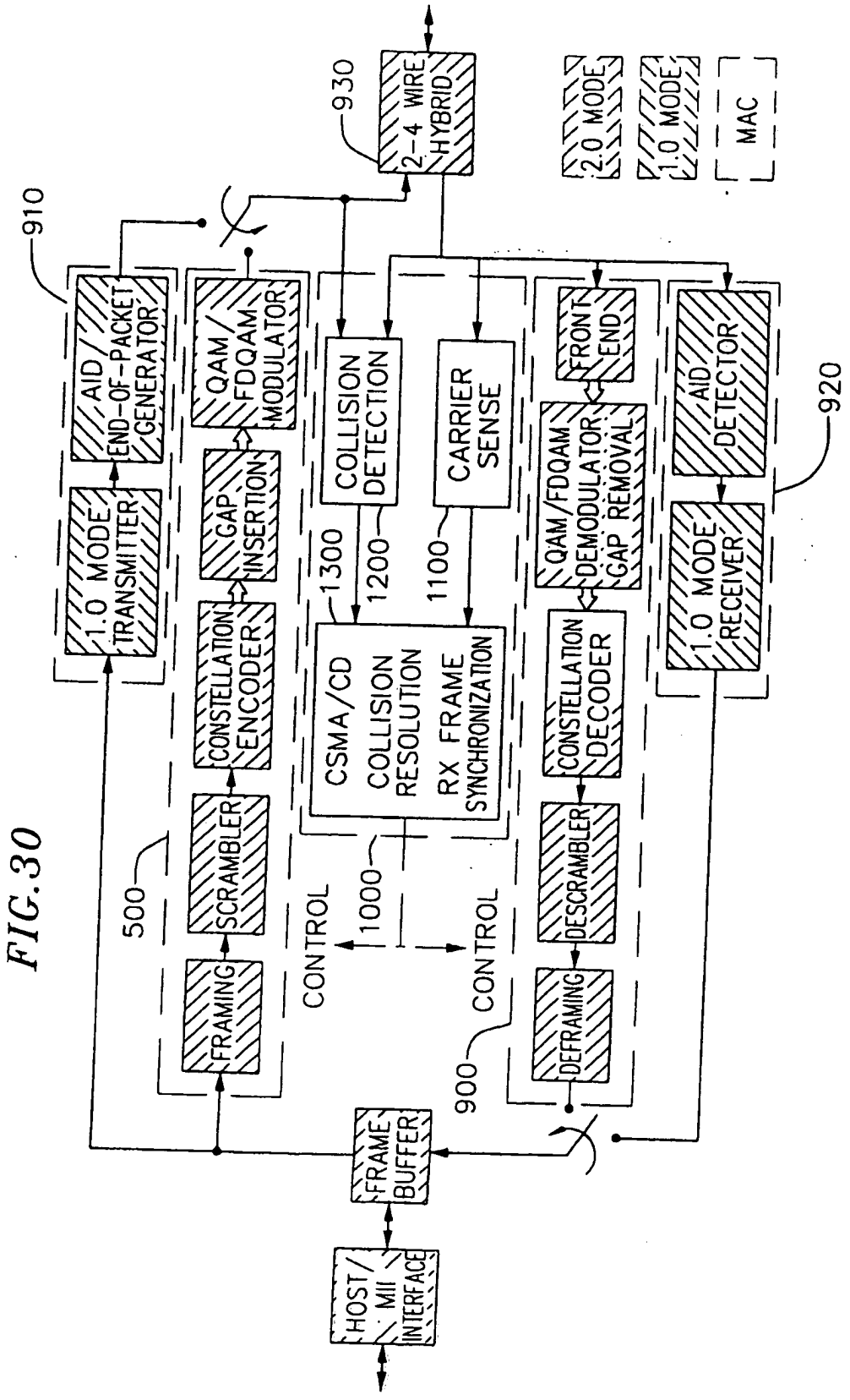
930
2-4 WIRE HYBRID
2.0 MODE
1.0 MODE
MAC
910
AID/ END-OF-PACKET GENERATOR
QAM/ FDQAM MODULATOR
COLLISION DETECTION
CARRIER SENSE
FRONT END
AID DETECTOR
920
1.0 MODE TRANSMITTER
GAP INSERTION
1300
1200
1100
QAM/FDQAM DEMODULATOR GAP REMOVAL
1.0 MODE RECEIVER
CONSTELLATION ENCODER
CSMA/CD COLLISION RESOLUTION RX FRAME SYNCHRONIZATION
CONSTELLATION DECODER
SCRAMBLER
500
1000
CONTROL
CONTROL
DESCRAMBLER
FRAMING
900
DEFRAMING
FRAME BUFFER
HOST/ MII INTERFACE

FIG. 30

FIG.37

FIELD	LENGTH	EXPLANATION
DA	6 OCTETS	DESTINATION ADDRESS
SA	6 OCTETS	SOURCE ADDRESS
ETHERTYPE	2 OCTETS	0x886c (LINK PROTOCOL FRAME. ASSIGNED TO ASSIGNEE BY IEEE)
SSTYPE	1 OCTET	0–RESERVED 1–RATE REQUEST CONTROL FRAME 2–LINK INTEGRITY SHORT FRAME 3–CAPABILITIES ANNOUNCEMENT 4–LARQ 5–VENDOR–SPECIFIC SHORT FORMAT TYPE 6–126 RESERVED 127 RESERVED VALUES 128–255 CORRESPOND TO THE LONG SUBTYPE
SSLENGTH	1 OCTET	NUMBER OF ADDITIONAL OCTETS IN THE CONTROL HEADER, STARTING WITH THE SSVERSION FIELD (OR THE FIRST OCTET FOLLOWING SSLENGTH IF IT IS NOT DEFINED AS SSVERSION) AND ENDING WITH THE SECOND (LAST) OCTET OF THE NEXT ETHERTYPE FIELD. MIN IS 2 AND MAX IS 255
SSVERSION	1 OCTET	VERSION NUMBER OF THE CONTROL INFORMATION
DATA	0–252 OCTETS	CONTROL INFORMATION
NEXT ETHERTYPE	2 OCTETS	ETHERTYPE/LENGTH OF NEXT LAYER PROTOCOL, 0 IF NONE.
PAD	41–0 OCTETS	PADDING REQUIRED TO MEET MINIMUM IF DATA<41 OCTETS
FCS	4 OCTETS	FRAME CHECK SEQUENCE

FIG. 42

BAND SPECIFICATION	A PAYLOAD ENCODING (PE) AND RANK ASSOCIATED WITH A GIVEN BAND. A BAND IS A SINGLE COMBINATION OF BAUD RATE, MODULATION TYPE (E.G. QAM OR FDQAM) AND CARRIER FREQUENCY. TWO BANDS ARE DEFINED IN HPNAV2
LOGICAL CHANNEL, CHANNEL	A FLOW OF FRAMES FROM A SENDER TO ONE OR MORE RECEIVERS ON A SINGLE NETWORK SEGMENT, CONSISTING OF ALL THE FRAMES WITH A SINGLE COMBINATION OF DA AND SA.
RECEIVER	A STATION THAT RECEIVES FRAMES SENT ON A PARTICULAR CHANNEL. IF THE DESTINATION IS A UNICAST ADDRESS THERE IS AT MOST ONE RECEIVER. IF THE DESTINATION IS A GROUP ADDRESS (INCLUDING BROADCAST), THERE MAY BE MANY RECEIVERS.
RECEIVER PE	THE PREFERRED PE TO BE USED ON THIS CHANNEL, AS DETERMINED BY THE RECEIVER.
RRCF	RATE REQUEST CONTROL FRAME. SENT FROM THE RECEIVER TO THE SENDER TO EFFECT A CHANGE IN PE.
REFADDR0	THE SA IN THE ETHERNET HEADER OF THE RRCF FRAME. THIS IS THE DA OF THE RECEIVER (FOR THE CHANNEL), AND IS ALWAYS USED BY THE CHANNEL SENDER AS THE FIRST REFADDR PROCESSED.
REFADDR1.. REFADDR<n>	OTHER ADDRESSES INCLUDING BROADCAST AND MULTICAST ADDRESSES FOR WHICH THE RECEIVER IS INDICATING RATE INFORMATION TO THE SENDER. THE CHANNEL RECEIVER'S STATION ADDRESS (REFADDR0) SHOULD NOT BE PUT IN THE LIST OF ADDITIONAL REFADDR'S. NOTE 1: AT LEAST ONE REFADDR FIELD IS NECESSARY TO SUPPORT RATE NEGOTIATION FOR BROADCAST AND MULTICAST ADDRESSES SINCE THESE CANNOT BE USED AS THE SOURCE ADDRESS IN THE ETHERNET HEADER.
SENDER	THE SENDING STATION FOR A CHANNEL, USUALLY THE STATION OWNING THE SOURCE MAC ADDRESS.
SENDER PE	THE PREFERRED PE ASSOCIATED WITH A CHANNEL, AS NOTED BY THE SENDER.

FIG. 45

FIELD	LENGTH	MEANING
DA	6 OCTETS	DESTINATION ADDRESS(FF.FF.FF.FF.FF.FF)
SA	6 OCTETS	SOURCE ADDRESS OF THE STATION THAT TRANSMITTED THIS FRAME
ETHERTYPE	2 OCTETS	0x886c (LINK CONTROL FRAME)
SSTYPE	1 OCTET	=3
SSLENGTH	1 OCTET	NUMBER OF ADDITIONAL OCTETS IN THE CONTROL HEADER, STARTING WITH THE SSVERSION FIELD AND ENDING WITH THE SECOND(LAST) OCTET OF THE NEXT ETHERYPE FIELD. MINIMUM IS 32 FOR SSVERSION 0.
SSVERSION	1 OCTET	=0
CSA_ID_SPACE	1 OCTET	IDENTIFIES THE REGISTRATION SPACE OF CSA_MFR_ID 0-UNSPECIFIED 1-JEDEC 2-PCI
CSA_MFR_ID	2 OCTETS	HW MANUFACTURER ID-IDENTIFIES THE MANUFACTURER OF THE PHY CONTROLLER CHIP. THE PURPOSE OF THIS FIELD PLUS THE PART NUMBER AND REVISION IS TO IDENTIFY SPECIFIC IMPLEMENTATIONS OF THE PHY SPECIFICATION. THIS IS NOT A BOARD OR ASSEMBLY-LEVEL IDENTIFIER.
CSA_PART_NO	2 OCTETS	HW MANUFACTURER PART NUMBER-THE PART NUMBER OF THE PHY CONTROLLER CHIP.
CSA_REV	1 OCTET	HW REVISION
CSA_OPCODE	1 OCTET	0-ANNOUNCE 1-REQUEST
CSA_MTU	2 OCTETS	MAXIMUM SIZE LINK-LEVEL PDU THIS RECEIVER ACCEPTS IN OCTETS, THE DEFAULT VALUE IS 1526 OCTETS. THIS IS ALSO THE MINIMUM VALUE THAT SHALL BE ACCEPTED BY ALL ILINE10 STATIONS.
CSA_SA	6 OCTETS	SOURCE ADDRESS OF THE STATION THAT GENERATED THIS CSA FRAME
CSA_PAD	2 OCTETS	RESERVED FOR VERSION 0. SHALL BE SENT AS 0, IGNORED ON RECEPTION.
CSA_ CURRENTTXSET	4 OCTETS	CONFIGURATION FLAGS, PLUS ALL CURRENT IN-USE STATUS FOR THIS STATION.
CSA_ OLDESTTXSET	4 OCTETS	A COPY OF THE "OLDEST" TX FLAGS FOR THIS STATIONS, FROM THE PERIOD ENDING AT LEAST ONE PERIOD (MINUTE) EARLIER.
CSA_ CURRENTRXSET	4 OCTETS	THE UNION OF RECENT FLAGS RECEIVED FROM OTHER STATION.
NEXT ETHERTYPE	2 OCTETS	=0
PAD		PAD TO REACH MINFRAMESIZE IF NECESSARY
FCS	4 OCTETS	

FIG.52a

FIELD	LENGTH	MEANING
DA	6 OCTETS	DESTINATION ADDRESS
SA	6 OCTETS	SOURCE ADDRESS
ETHERTYPE	2 OCTETS	0x886c (LINK CONTROL FRAME)
SSTYPE	1 OCTET	=4
SSLENGTH	1 OCTET	NUMBER OF ADDITIONAL OCTETS IN THE CONTROL HEADER, STARTING WITH THE SSVERSION FIELD AND ENDING WITH THE SECOND(LAST) OCTET OF THE NEXT ETHERYPE FIELD. SSLENGTH IS 6 FOR SSVERSION 0.
SSVERSION	1 OCTET	=0
LARQ_HDR DATA	3 OCTETS	LARQ CONTROL HEADER DATA WITH LARQ_CTL BIT=1,LARQ_NACK=0.
NEXT ETHERTYPE	2 OCTETS	=0
PAD	38 OCTETS	
FCS	4 OCTETS	FRAME CHECK SEQUENCE

FIG.52b

FIELD	LENGTH	MEANING
DA	6 OCTETS	DESTINATION ADDRESS
SA	6 OCTETS	SOURCE ADDRESS
ETHERTYPE	2 OCTETS	0x886c (LINK CONTROL FRAME)
SSTYPE	1 OCTET	=4
SSLENGTH	1 OCTET	NUMBER OF ADDITIONAL OCTETS IN THE CONTROL HEADER, STARTING WITH THE SSVERSION FIELD AND ENDING WITH THE SECOND(LAST) OCTET OF THE NEXT ETHERYPE FIELD. SSLENGTH IS 12 FOR NACK FRAMES WITH SSVERSION 0.
SSVERSION	1 OCTET	=0
LARQ_HDR DATA	3 OCTETS	LARQ CONTROL HEADER DATA WITH LARQ_CTL BIT=1,LARQ_NACK=1..7.
NACK_DA	6 OCTETS	ORIGINAL DESTINATION ADDRESS
NEXT ETHERTYPE	2 OCTETS	=0
PAD	32 OCTETS	
FCS	4 OCTETS	FRAME CHECK SEQUENCE

FIG.52c

FIELD	LENGTH	MEANING
DA	6 OCTETS	DESTINATION ADDRESS (FROM ORIGINAL ETHERNET PDU)
SA	6 OCTETS	SOURCE ADDRESS (FROM ORIGINAL ETHERNET PDU)
ETHERTYPE	2 OCTETS	0x886c (LINK CONTROL FRAME)
SSTYPE	1 OCTET	=4
SSLENGTH	1 OCTET	NUMBER OF ADDITIONAL OCTETS IN THE CONTROL HEADER, STARTING WITH THE SSVERSION FIELD AND ENDING WITH THE SECOND(LAST) OCTET OF THE NEXT ETHERYPE FIELD. SSLENGTH IS 6 FOR SSVERSION 0.=6
SSVERSION	1 OCTET	=0
LARQ_HDR DATA	3 OCTETS	LARQ ENCAPSULATION HEADER DATA (WITH LARQ_CTL BIT=0)
NEXT ETHERTYPE	2 OCTETS	FROM ORIGINAL ETHERNET PDU
PAYLOAD	MIN 46 OCTETS	FROM ORIGINAL ETHERNET PDU PAYLOAD
FCS	4 OCTETS	FRAME CHECK SEQUENCE

FIG.52d

OCTET	FIELD	LENGTH	MEANING
FLAGS0	LARQ_MULT	1 BIT	MULTIPLE RETRANSMISSION FLAG. 0 IN THE ORIGINAL TRANSMISSION OF A DATA FRAME. FOR RETRANSMITTED FRAMES (LARQ_RTX=1), SET TO THE VALUE OF LARQ_MULT IN THE NACK FRAME THAT CAUSED THE RETRANSMISSION. THIS FLAG CAN BE USED BY RECEIVERS TO MEASURE THE ROUND-TRIP TIMES ASSOCIATED WITH THE MISS/NACK/RECEIVE-RTX PROCESS.
	LARQ_RTX	1 BIT	0 FOR FIRST TRANSMISSION OF A FRAME, 1 IF FRAME IS RETRANSMITTED. STATIONS NOT IMPLEMENTING LARQ SHALL DROP ANY DATA FRAME IF THIS BIT IS 1.
	LARQ_NORTX	1 BIT	0 IF IMPLEMENTATION SUPPORTS RETRANSMISSION, 1 IF ONLY PRIORITY IS MEANINGFUL. MAY BE USED ON A PER CHANNEL BASIS.
	LARQ_NEWSEQ	1 BIT	1 IF THE SEQUENCE NUMBER SPACE FOR THE CHANNEL HAS BEEN RESET, AND OLDER SEQUENCE NUMBERS SHOULD NOT BE NACKED, 0 OTHERWISE.
	LARQ_CTL	1 BIT	"0" WHEN IN ENCAPSULATION FORMAT
	PRIORITY	3 BITS	LINK LAYER PRIORITY OF THIS FRAME
FLAGS1_SEQ0	RESERVED	4 BITS	RESERVED, SHALL BE 0
	LARQ_SEQ_HIGH	4 BITS	HIGH 4 BITS OF SEQUENCE NUMBER
SEQ1	LARQ_SEQ_LOW	8 BITS	LOW 8 BITS OF SEQUENCE NUMBER

FIG. 52f. 1

CONTROL FRAME	A FRAME GENERATED BY A LARQ PROTOCOL MODULE THAT CONTAINS ONLY A LARQ PROTOCOL HEADER AS ITS PAYLOAD.
CURRENT SEQUENCE NUMBER	THE MOST RECENTLY RECEIVED NEW SEQUENCE NUMBER FOR A CHANNEL
DATA FRAME	ANY STANDARD ETHERNET FRAME FROM HIGHER (THAN LARQ) PROTOCOL LAYERS. A LARQ-ENABLED STATION ENCAPSULATES THE ORIGINAL PAYLOAD OF AN ETHERNET FRAME BY INSERTING A LARQ HEADER (SHORT FORM CONTROL HEADER WITH LARQ_HDR DATA) BETWEEN THE SOURCE ADDRESS AND THE REMAINDER OF THE FRAME BEFORE THE FRAME IS PASSED DOWN TO THE DRIVER FOR TRANSMISSION ON THE NETWORK.
FORGET TIMER	AN IMPLEMENTATION DEPENDENT MECHANISM TO ALLOW A RECEIVER TO RESET THE SEQUENCE NUMBER SPACE OF A CHANNEL WHEN A RECEIVED SEQUENCE NUMBER IS NOT THE NEXT EXPECTED (CURRENT SEQUENCE NUMBER+1). ONE SECOND IS A SUGGESTED DEFAULT VALUE.
HOLD TIMER, LOST TIMER	AN IMPLEMENTATION DEPENDENT TIMING MECHANISM THAT LIMITS THE TIME A RECEIVER WILL HOLD ONTO A RECEIVED FRAME WHILE WAITING FOR A MISSING FRAME TO BE RETRANSMITTED. CONCEPTUALLY, THERE IS ONE SUCH TIMER PER MISSING SEQUENCE NUMBER. THE TIMER INTERVAL IS MAXIMUM HOLD INTERVAL.
LOGICAL CHANNEL, CHANNEL	A FLOW OF FRAMES FROM A SENDER TO ONE OR MORE RECEIVERS ON A SINGLE NETWORK SEGMENT CONSISTING OF ALL THE FRAMES WITH A SINGLE COMBINATION OF DESTINATION ADDRESS, SOURCE ADDRESS, AND LINK LAYER PRIORITY.
NACK, Nack, nack	AN INDICATION FROM A RECEIVER TO A SENDER REQUESTING RETRANSMISSION OF ONE OR MORE FRAMES. ALSO, THE ACTION OF PROVIDING SUCH AN INDICATION. E.G. "TO NACK A SEQUENCE NUMBER" MEANING TO SEND A NACK INDICATION.
NACK TIMER	AN IMPLEMENTATION DEPENDENT TIMING MECHANISM USED BY A RECEIVER TO RETRANSMIT NACKS FOR MISSING SEQUENCE NUMBERS. CONCEPTUALLY, THERE IS ONE SUCH TIMER PER MISSING SEQUENCE NUMBER PER LOGICAL CHANNEL. THE TIMER IS RESET EACH TIME A NACK IS SENT FOR A SEQUENCE NUMBER. THE TIMER INTERVAL IS NACK RETRANSMISSION INTERVAL.
NEW	A NEW SEQUENCE NUMBER IS ONE WHOSE DIFFERENCE FROM THE CURRENT SEQUENCE NUMBER FOR THE CHANNEL, MODULO THE SIZE OF THE SEQUENCE NUMBER SPACE AND CONSIDERED AS A SIGNED INTEGER, IS GREATER THAN 0. IN PARTICULAR, THE NUMBERS (CURRENT+1) THROUGH (CURRENT+2047).
OLD	AN OLD SEQUENCE NUMBER IS ONE WHOSE DIFFERENCE FROM THE CURRENT SEQUENCE NUMBER FOR THE CHANNEL, MODULO THE SIZE OF THE SEQUENCE NUMBER SPACE AND CONSIDERED AS A SIGNED INTEGER, IS LESS THAN OR EQUAL TO 0. IN PARTICULAR, THE NUMBERS (CURRENT-2048) THROUGH (CURRENT) ARE OLD. NOTE, HOWEVER, THAT MOST OF THE OLD SEQUENCE NUMBERS ARE ALSO OUT-OF-SEQUENCE.

FIG.53

SEND SEQUENCE NUMBER	THE SEQUENCE NUMBER OF THE MOST RECENTLY TRANSMITTED DATA FRAME.
REMINDER TIMER INTERVAL	A FIXED INTERVAL. THE DEFAULT IS 50 MS. LOWER VALUES WILL INCREASE THE OVERHEAD OF REMINDERS ON NETWORK LOAD, WHILE HIGHER VALUES INCREASE THE LATENCY FOR END-OF-SEQUENCE FRAMES REQUIRING RETRANSMISSION. IMPLEMENTATIONS SHOULD NOT USE VALUES OUTSIDE OF THE RANGE 25-75 MS, BASED ON 150 MS MAXIMUM SAVE AND HOLD TIMES.
MINIMUM RETRANSMISSION INTERVAL	AN INTERVAL USED TO PREVENT TOO-FREQUENT RETRANSMISSIONS OF A SINGLE FRAME. MOST IMPORTANT FOR MULTICAST CHANNELS. THE DEFAULT IS 10 MS.
MAXIMUM SAVE LIMIT	THE MAXIMUM NUMBER OF FRAMES THAT WILL BE SAVED FOR A SINGLE LOGICAL CHANNEL. THIS IS IMPLEMENTATION DEPENDENT, AND VARIES WITH THE MAXIMUM FRAME RATE THE SENDER IS EXPECTED TO SUPPORT. VALUES OF 100 OR MORE CAN BE USEFUL FOR HIGH-SPEED APPLICATIONS SUCH AS VIDEO.
MAXIMUM SAVE INTERVAL	THE MAXIMUM TIME THAT THE SENDER WILL NORMALLY SAVE A FRAME FOR POSSIBLE RETRANSMISSION. THE DEFAULT IS 150 MS.

FIG.54

CURRENT SEQUENCE NUMBER	THE MOST RECENT SEQUENCE NUMBER RECEIVED IN A LARQ HEADER FOR THE CHANNEL, WHETHER IN A DATA FRAME OR A REMINDER CONTROL FRAME.
OLDEST MISSING SEQUENCE NUMBER	THE OLDEST SEQUENCE NUMBER FOR A FRAME NOT YET RECEIVED WHICH HAS NOT BEEN DECLARED LOST.
MAXIMUM HOLD INTERVAL	THE LONGEST INTERVAL THAT A FRAME WILL BE HELD AWAITING AN EARLIER MISSING FRAME. THE DEFAULT IS TO USE THE SAME VALUE AS MAXIMUM SAVE INTERVAL, WHICH HAS A DEFAULT OF 150 MS.
MAXIMUM RECEIVE LIMIT	THE MAXIMUM NUMBER OF FRAMES THAT A RECEIVER WILL BUFFER WHILE AWAITING AN EARLIER MISSING FRAME. THE DEFAULT SHOULD NORMALLY BE THE SAME AS THE MAXIMUM SAVE LIMIT.
NACK RETRANSMISSION INTERVAL	THE INTERVAL AFTER WHICH A RECEIVER WILL RETRANSMIT A NACK CONTROL FRAME FOR A MISSING SEQUENCE NUMBER, WITH THE EXPECTATION THAT EARLIER NACK CONTROL FRAMES OR DATA FRAME RETRANSMISSIONS WERE LOST. THE DEFAULT FOR FIXED IMPLEMENTATIONS IS 20 MS.

FIG.58

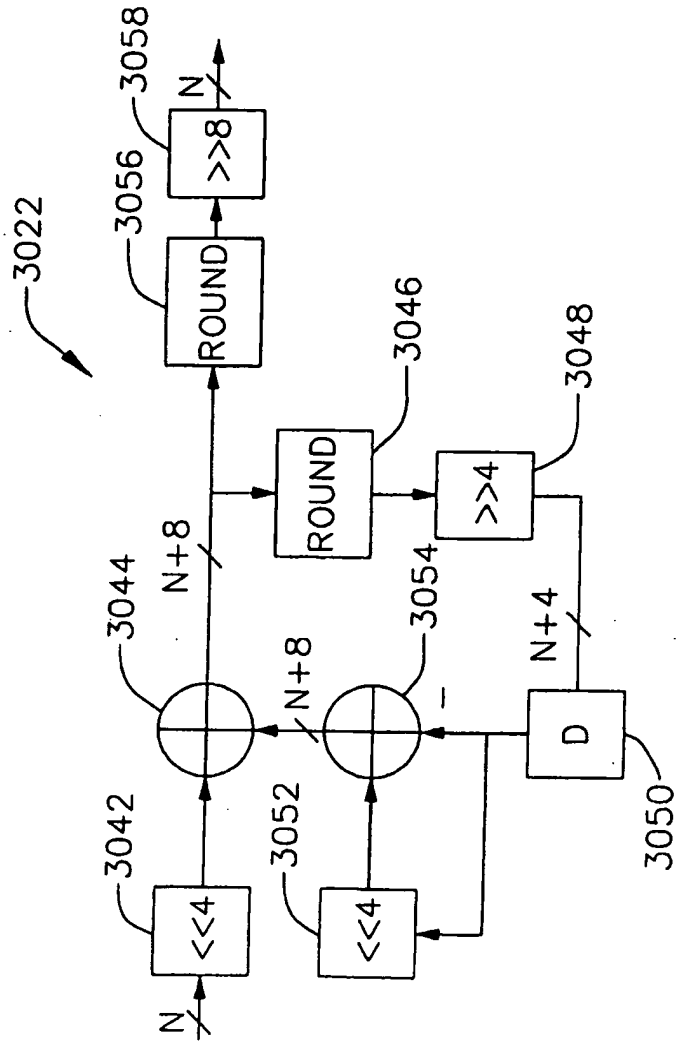
3022
3058
N
>>8
3056
ROUND
3046
ROUND
3048
>>4
N+8
3044
N+8
3054
N+4
D
3050
3042
<<4
N
3052
<<4

FIG. 73

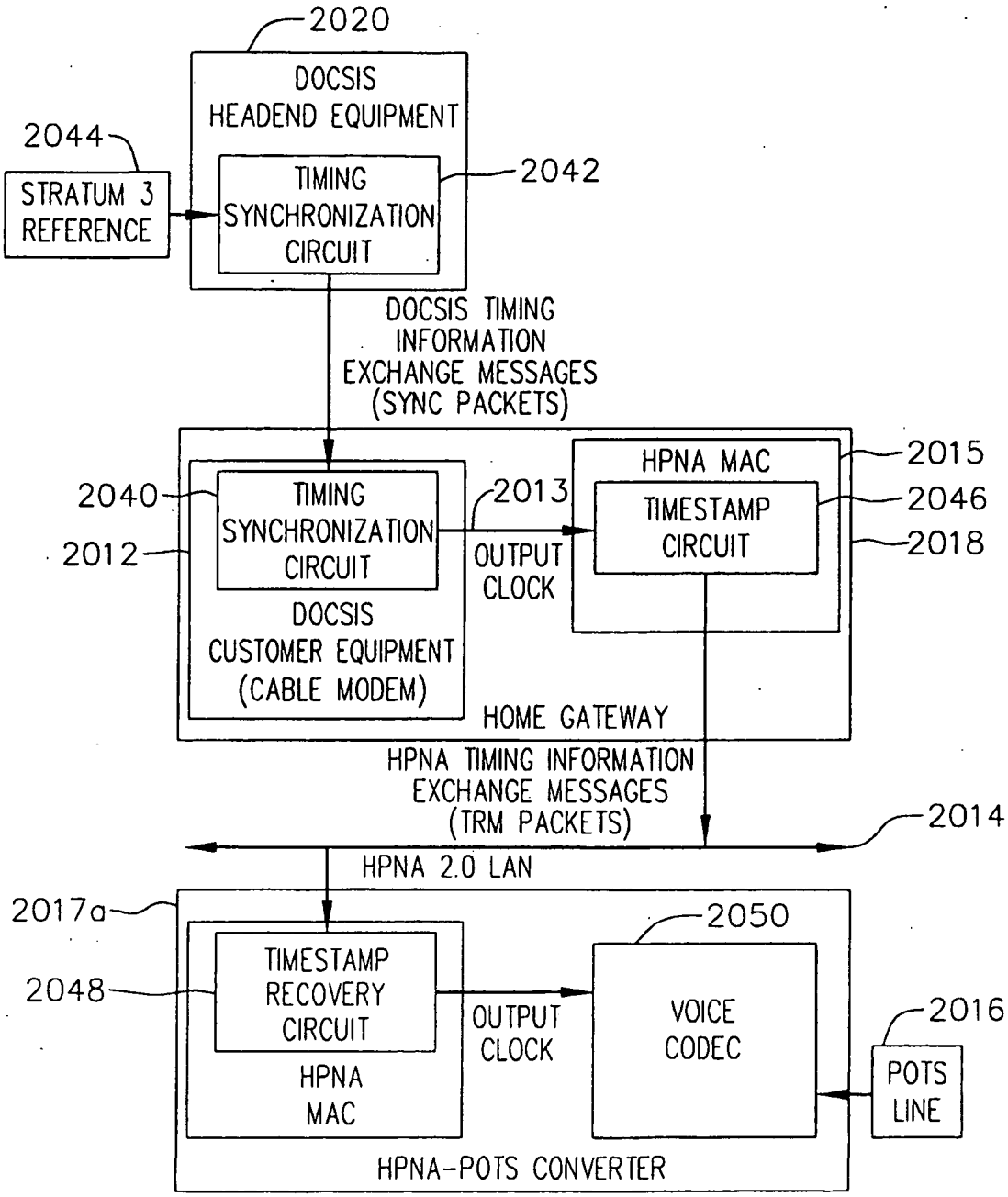
2020
DOCSIS HEADEND EQUIPMENT
2044
STRATUM 3 REFERENCE
TIMING SYNCHRONIZATION CIRCUIT
2042
DOCSIS TIMING INFORMATION EXCHANGE MESSAGES (SYNC PACKETS)
HPNA MAC
2015
2040
TIMING SYNCHRONIZATION CIRCUIT
2013
TIMESTAMP CIRCUIT
2046
2012
OUTPUT CLOCK
2018
DOCSIS CUSTOMER EQUIPMENT (CABLE MODEM)
HOME GATEWAY
HPNA TIMING INFORMATION EXCHANGE MESSAGES (TRM PACKETS)
2014
HPNA 2.0 LAN
2017a
2050
TIMESTAMP RECOVERY CIRCUIT
2048
OUTPUT CLOCK
VOICE CODEC
2016
POTS LINE
HPNA MAC
HPNA-POTS CONVERTER

FIG. 74

PARAMETER	UPSTREAM "10E-6 CASE	UPSTREAM 91% CASE	UPSTREAM 90% CASE	DOWNSTREAM "10E-6 CASE	DOWNSTREAM 91% CASE	DOWNSTREAM 90% CASE
ACCESS DELAY	3.1	1.3	1.3	3.1	1.3	1.3
COLLISION RESOLUTION	2.7	2.7	0.8	2.7	2.7	0.8
3 UP, 1 DOWN	2.1	1.0	1.0	2.1	1.0	1.0
LAST UP	0.5	0.3	0.3	0.5	0.3	0.3
COLLISION RESOLUTION	0.8	0.8	0.8	0.8	0.8	0.8
3 UP, 1 DOWN	2.1	1.0	1.0	2.1	1.0	1.0
LAST UP	0.5	0.3	0.3	0.5	0.3	0.3
3 DOWN				1.5	0.8	0.8
3 DOWN				1.5	0.8	0.8
TOTAL LATENCY	11.8	7.4	5.5	14.9	8.9	7.1

10E-6 CASE IS 10E-6 CRA ONCE OF TWO TRIES IN HOMES WITH MAXIMUM 4MBITS/SEC RAW RATE
91% CASE IS 10E-6 CRA ONCE OF TWO TRIES IN HOMES WITH MINIMUM 10MBITS/SEC RAW RATE
90% CASE IS 10E-1 CRA TWICE IN TWO TRIES IN HOMES WITH MINIMUM 10MBITS/SEC RAW RATE

VALUES IN THE TABLE ABOVE ARE IN MILLISECONDS.

OVERHEADS:

IFG	PER COLL	FRAME HDR	LARQ HDR	RTP_HDR	LINEAR PCM FRAME SIZE	5 NODES CRA 10E-6	5 NODES CRA 10E-1	5 NODES CRA FIXED
0.018	0.206	0.07	8	40	160	13	4	2
MSEC	MSEC	MSEC	BYTES	BYTES	BYTES	COLLISIONS	COLLISIONS	COLLISIONS

FRAME HEADER INCLUDES PREAMBLE, FC, DA, SA, T/L, EOF

FIG. 75

	UPSTREAM			DOWNSTREAM		
PARAMETER	"10E-6 CASE	91% CASE	90% CASE	"10E-6 CASE	91% CASE	90% CASE
ACCESS DELAY	3.1	1.3	1.3	3.1	1.3	1.3
COLLISION RESOLUTION	0.4	0.4	0.4	0.4	0.4	0.4
3 UP, 1 DOWN	1.4	0.8	0.8	1.4	0.8	0.8
LAST UP	0.5	0.3	0.3	0.5	0.3	0.3
COLLISION RESOLUTION	0.0	0.0	0.0	0.0	0.0	0.0
3 UP, 1 DOWN	0.0	0.0	0.0	0.0	0.0	0.0
LAST UP	0.0	0.0	0.0	0.0	0.0	0.0
3 DOWN				1.1	0.6	0.6
3 DOWN				0.0	0.0	0.0
TOTAL LATENCY	5.5	2.7	2.7	6.5	3.3	3.3

Fig. 77(1)

Field	Length	Meaning
DA	6 octets	Destination Address
SA	6 octets	Source Address
Ethertype	2 octets	(TBD) = VOHN Link Control Frame - new IEEE assignment
Type	2 octets	2 = Timestamp Report Message
Length	2 octets	Number of additional octets in the signaling frame, starting with Version field and ending with the last octet of the Data Payload field. Minimum is 2.
Version	2 octets	= 0
TSMSeqNum	2 octets	Sequence number of TSM to which the Timestamp in this message is applicable.
Timestamp	4 octets	Timestamp of a previously transmitted Timestamp Report Message, corresponding to TSMSeqNum.
Frequency	2 octets	Resolution of the timestamp and Gtimestamp fields, in ticks/1.000ms. For example, value 32768 corresponds to one clock tick at 32.768Mhz, in which the LSBit of the Timestamp corresponds to a time of 0.030517578125μsec. The Timestamp will rollover every 131 seconds = 2.2 minutes
NumGrants	2 octets	Number of Grant Timestamps specified in the payload of this control message. NumGrants may be zero. Each grant timestamp is accompanied by a Line ID and Call ID field. Including the Grant Timestamp, the total for each grant timestamp is 8 bytes.

FIG. 81

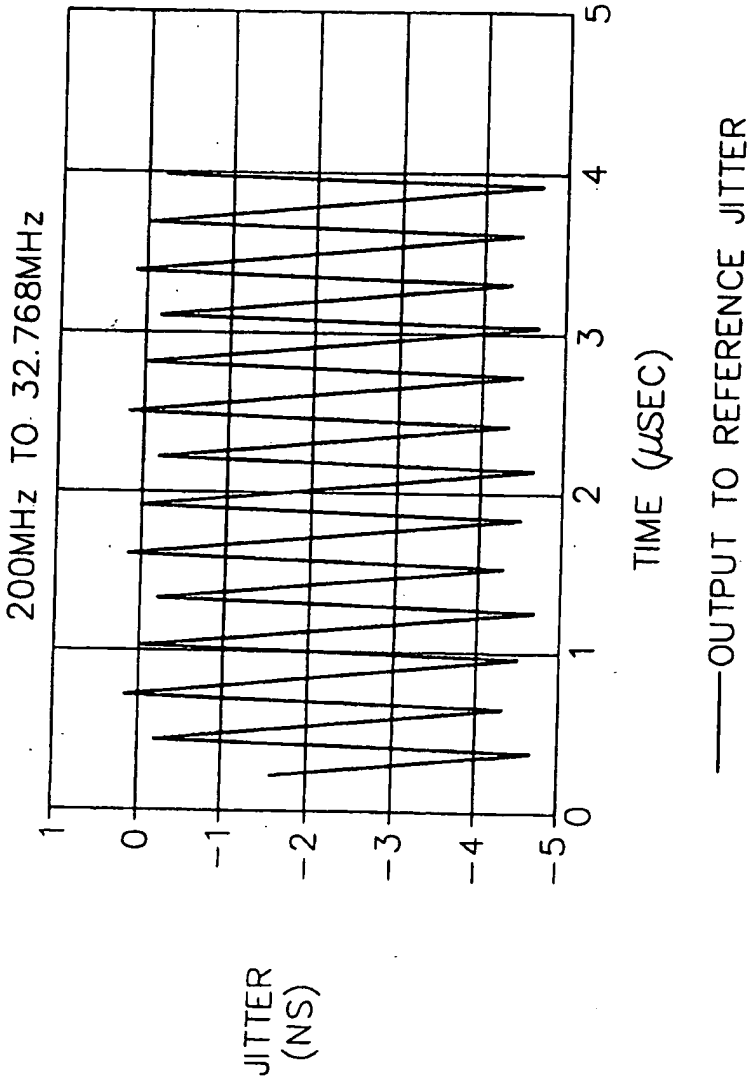
200MHz TO 32.768MHz
JITTER (NS)
1
0
-1
-2
-3
-4
-5
0
1
2
3
4
5
TIME (μSEC)
—OUTPUT TO REFERENCE JITTER

FIG.88

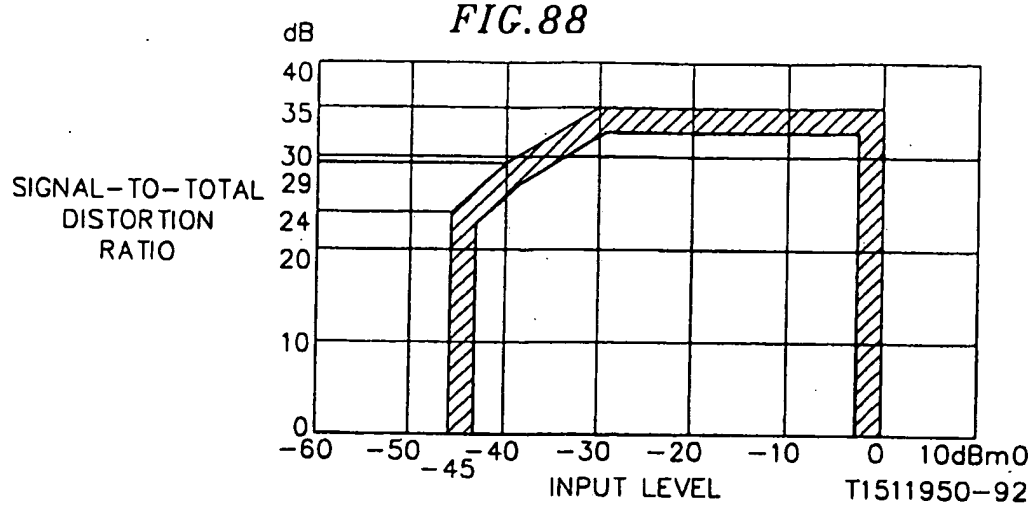

FIG.89a

INPUT LEVEL	UNIFORM QUANTIZER +COMPANDER SNR	THE REQUIRED SNR FOR THE ADC/DAC
0dBm	38.43dB	60dB
-30dBm	35.50dB	54dB
-40dBm	30.09dB	44dB

FIG.89b

INPUT LEVEL	G.712 SNR SPEC	THE TOTAL SNR WITH UNIFORM QUANTIZER+COMPANDER+JITTER CLOCK
0dBm	35dB	38.32dB (60dB ADC/DAC SNR IS USED)
-30dBm	35dB	35.42dB (54dB ADC/DAC SNR IS USED)
-40dBm	29dB	30.05dB (44dB ADC/DAC SNR IS USED)

FIG.89c

INPUT LEVEL	G.712 SNR SPEC	THE TOTAL SNR WITH UNIFORM QUANTIZER+COMPANDER+JITTER CLOCK
0dBm	35dB	38.38dB (60dB ADC/DAC SNR IS USED)
-30dBm	35dB	35.26dB (54dB ADC/DAC SNR IS USED)
-40dBm	29dB	30.03dB (44dB ADC/DAC SNR IS USED)